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Overview: Apple MIDI Interface

MIDI (Musical Instrument Digital Interface) is a communications protocol originally intended to provide a standard way of exchanging information between electronic musical instruments, and between computers and musical instruments. Today the MIDI role is expanding to include other media-related purposes—such as control of stage lighting, mixing consoles, slide projectors, and interfaces to video for sound/video synchronization.

The Apple® MIDI Interface connects an Apple IIgs® or Macintosh® computer to any MIDI-equipped instrument or device. Small enough to fit in your pocket, the Apple MIDI Interface does not require a separate power supply and is compatible with all Apple IIgs-specific MIDI software. It comes with everything you need to connect an Apple IIgs to a MIDI-equipped device:

- The interface
- Two MIDI cables, for connecting the interface to the instrument

- Peripheral cable, for connecting the interface to the computer

The Apple IIgs, MIDI, and Music

By connecting the Apple MIDI Interface to an Apple IIgs, and using MIDI software and instruments with MIDI support, you can use your computer to compose, edit, orchestrate, and control playback of music on MIDI instruments, such as keyboard synthesizers, drum machines, and sound modules. You can then use your computer and MIDI notation software to transcribe music that you can edit, save to disk, and print.

With a MIDI box connected to the computer, MIDI-sequencer software, and MIDI-controlled synthesizers, a single musician can compose and play back an entire composition. This gives the arranger/composer the ability to experiment with alternative



parts and arrangements before bringing in other musicians. Special MIDI software programs give musicians the ability to store and edit large libraries of sounds on floppy disks or hard disks, and to design sounds never heard before.

Connecting the Apple MIDI Interface to an Apple IIgs

You can connect the Apple MIDI Interface to either the Printer port or the Modem port of the Apple IIgs system. However, the software you use may require you to use one or the other of the two ports; consult the software manual for proper port selection.

Follow these steps to connect one MIDI device to your computer:

1. Run one MIDI cable from the In port on the MIDI interface to the Out port on the MIDI device.
2. Connect the other MIDI cable from the MIDI Out port of the MIDI interface to the In port of the MIDI device.
3. With the computer turned off, connect one end of the mini-circular-8 cable to the computer and the other end to the MIDI interface.

Follow these steps to connect 2 to 16 MIDI devices to your computer (see Figure 1).

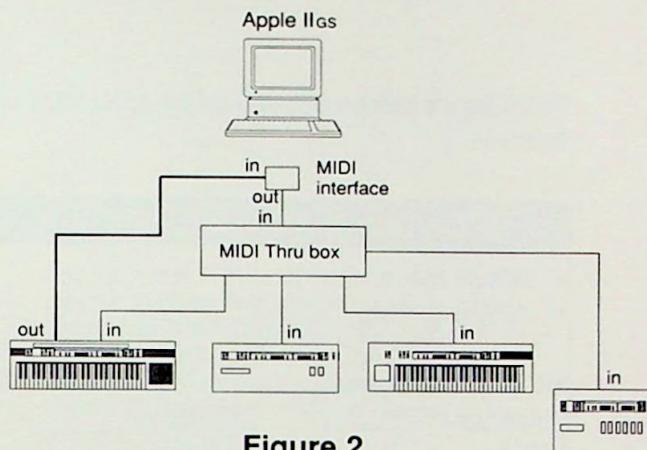


Figure 2

1. Connect the first device (the one with a keyboard) by running one MIDI cable from the Out port on the MIDI interface to the In port on the MIDI device.
2. Run another MIDI cable from the Thru port on the first MIDI device to the In port on the next MIDI device. Repeat this step as many times as necessary, for up to 16 devices.
3. Connect a MIDI cable from the MIDI Thru port of the last MIDI device to the In port of the MIDI interface.
4. With the computer turned off, connect one end of the mini-circular-8 cable to the computer and the other end to the MIDI interface.

Note that each time you use MIDI Thru, you introduce about 2 milliseconds of delay into the MIDI communications. With many such delays, you may begin to notice poor time-keeping in the musical tempo. To overcome this delay, a "MIDI Thru box" or "MIDI patcher" can be used (see Figure 2).

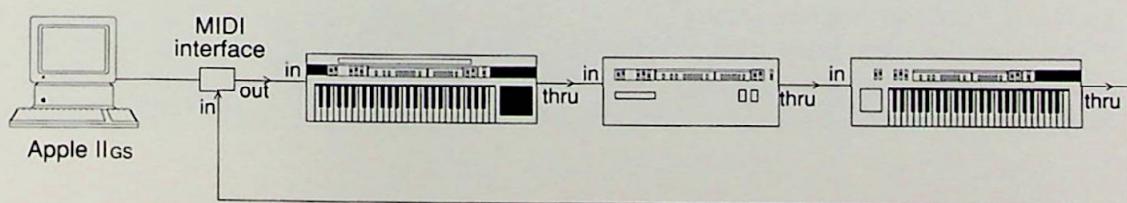


Figure 1

Following are the specifications for the Apple MIDI Interface:

Size

- Depth: 1.31 in.
- Width: 2.08 in.
- Length: 2.92 in.

MIDI DIN 5 Pinouts

<u>Connector</u>	<u>Pin No.</u>	<u>Description</u>
MIDI In	1	No Connect
MIDI In	2	Shield Ground
MIDI In	3	No Connect
MIDI In	4	Interface Enable
MIDI In	5	Data In
MIDI Out	1	No Connect
MIDI Out	2	Shield Ground
MIDI Out	3	No Connect
MIDI Out	4	+5 Volts
MIDI Out	5	Data Out

Connectors and Cables

<u>Port</u>	<u>Connector</u>	<u>Cable Length</u>
MIDI In	DIN 5	2 meters
MIDI Out	DIN 5	2 meters
Serial	Mini-circular-8	46 centimeters

Apple II and MIDI: Q&A

Q: To use my Apple IIe with MIDI, what kind of interface do I need?

A: You can purchase a MIDI interface card to install in Slot 2 of your computer. Such a device, called "Card 6850 MIDI" in the GS/OS® Installer, is available from Passport Designs (see *Passport Music Products*, on page 5).

Q: I have Apple IIe MIDI software that I want to use with my Apple IIgs. Can I use a MIDI interface card with my Apple IIgs?

A: Yes. However, you won't be able to get maximum IIgs® performance. Software specifically designed for the IIgs is more powerful and easier to use than the older IIe products.

Q: Can I use Apple IIe MIDI software on my Apple IIgs?

A: Although Apple designed the IIgs computer to run Apple IIe software, hardware differences cause compatibility problems for MIDI applications. If you use a MIDI interface card with your IIgs instead of an external MIDI interface, you can use some IIe software that has been updated for such use. Check with the software publisher. However, your software will not be able to access the extended memory and graphics capabilities of the IIgs.



PASSPORT. Music Products

Passport Designs makes a wide selection of MIDI products. Following is a list of Passport software and hardware for the Apple II family of computers.

SEQUENCERS	REQUIREMENTS
<ul style="list-style-type: none">Master Tracks PRO: Master Tracks PRO is professional-caliber sequencing software that is designed specifically for the Apple IIgs and is fully compatible with industry-standard MIDI files.	Apple IIgs with 1.25 megabytes of memory and an external MIDI interface (Apple IIgs and Macintosh Passport MIDI Interface, Apple MIDI Interface, or compatible MIDI interface); MIDI cables; any MIDI-equipped synthesizer, drum machine, or other MIDI equipment capable of sending and/or receiving MIDI data.
<ul style="list-style-type: none">Master Tracks Jr.: A low-cost sequencer based on Master Tracks PRO, Master Tracks Jr. is fully compatible with Master Tracks PRO and with industry-standard MIDI files.	Apple IIgs with 1.25 megabytes of memory, an external MIDI interface, MIDI cables, compatible MIDI software, MIDI-equipped instruments.
<ul style="list-style-type: none">Master Tracks: Sequencing software for the Apple IIe, Master Tracks can also be used with the Apple IIgs—although the software is not specifically designed to take advantage of the capabilities of the IIgs.	Apple IIe or Apple IIgs computer, Passport MIDI Interface Card, MIDI-equipped synthesizer(s); game paddles or joystick.



INTERFACES	INTERFACES
<ul style="list-style-type: none"> Apple IIgs and Macintosh Passport MIDI Interface: This serial port interface provides one MIDI In and one MIDI Out, and can be used with either the Modem port or the Printer port of the Apple IIgs. 	<ul style="list-style-type: none"> Apple IIe Passport MIDI Interface: This expansion card provides one MIDI In, one MIDI Out, Tape In, Tape Out, and Clock Out for non-MIDI drum machines and sequencers. Compatible with Apple II Plus, IIe, IIgs computers.
OTHER MIDI SOFTWARE	REQUIREMENTS
<ul style="list-style-type: none"> Polywriter: Music-printing software for the Apple II. 	Apple II Plus, IIe, or IIgs computer; at least one disk drive; video monitor; MIDI-equipped keyboard; ImageWriter®, ImageWriter II, Scribe® printer or other dot matrix printer with graphics capabilities; Grappler (Orange Micro) compatible printer interface (not needed for IIgs); Passport MIDI Interface card.
<ul style="list-style-type: none"> Music Tutor: Music education software for the Apple IIe that includes three separate ear-training programs (Chords, Intervals, and Record Keeper). 	Apple II computer, disk drive, Passport MIDI Interface Card, MIDI-equipped synthesizer.
<ul style="list-style-type: none"> Polywriter Utilities: Integrated playback for Polywriter and Master Tracks on the Apple II. 	See listing for Polywriter (above).

For more information, contact Passport at the following address:

Passport Designs, Inc.
625 Miramontes Street
Half Moon Bay, CA 94019
(415) 726-0280



Using AppleShare IIgs with GS/OS and Aristotle

Installing AppleShare® IIgs software is relatively easy, but you may run into problems if you aren't aware of some simple rules. In addition, the Aristotle™ menu management software has its own set of rules. And, the combination of AppleShare and Aristotle can cause headaches for both installers and users. To reduce problems with AppleShare and Aristotle, you should be aware of the following issues:

Network Booting an Apple IIgs

- If an Apple IIgs will be starting up from an AppleShare file server, the user will have to log on to the server while booting. The server privileges must allow use of the GS/OS files. If they don't, the user gets cryptic error messages when GS/OS tries to boot but can't access all its files.

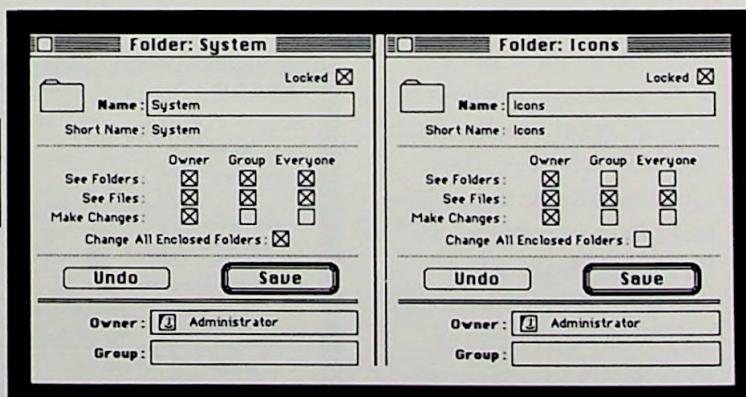
The key is to make sure that all of the GS/OS system files and folders on the server are set to allow the user to see them. AppleShare privileges must allow "See Files" and "See Folders" privileges for the server volume, the GS/OS System Folder, and all folders within it. If the user's startup application is set to the Finder™, AppleShare privileges must allow the user to have See Files privileges for the Icons folder. With the correct settings selected, the user can boot GS/OS from the server.



- GS/OS Version 5.0 provides network file services to an AppleShare file server over bridges. However, network startup must take place within the physical network—not across a bridge.
- If you want a IIgs to boot only from the server, don't set the startup slot to "Scan"; use Slot 7 to ensure that the boot process works only across the network. Setting the startup slot to Scan allows network booting as long as the server is available when the Apple IIgs starts up. However, if the server is unavailable as the Apple IIgs system starts up, and if a startup disk is in an attached disk drive, booting will take place from the disk drive.

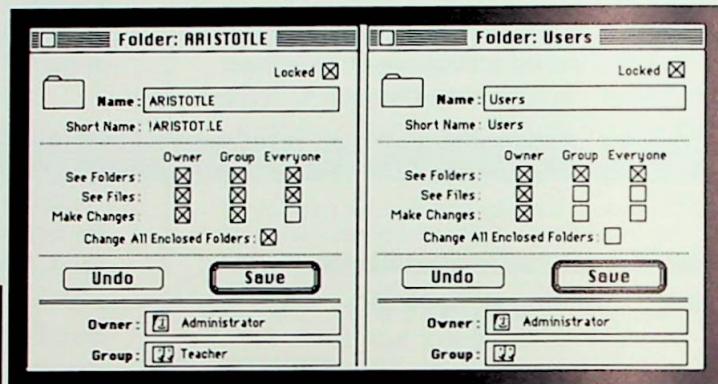
Aristotle Administration

Setting up and administering an Aristotle system entails potential snags that may plague first-time installations. Aristotle has important file access privilege requirements, and strange things can happen when they aren't followed. For example, teachers might notice that new users don't show up in the list of students—no matter how many times



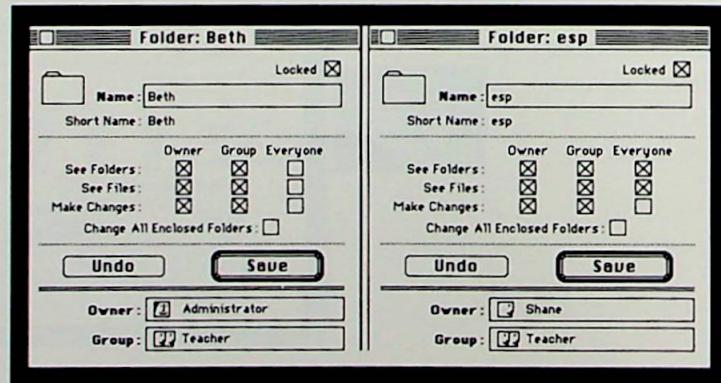
they try to add them. To avoid such problems, here are a few important factors to keep in mind:

- Remember to set the primary group for all users who are teachers to "Teacher" on the AppleShare file server; students' primary group must be set to "Student." This is a fundamental requirement.
- Set the AppleShare privileges for the Aristotle folder—and both folders within it—to allow the "Owner," the "Group," and "Everyone" to have See Files and See Folders privileges. In addition, the Owner and the Group should have Make Changes privileges, and the Group must be set to "Teacher."
- Verify the access privileges for the Users folder on the server volume. The Owner, the Group, and Everyone should have See Folders privileges.
- Within the Users folder, set privileges for the individual student and teacher folders so that the Owner and Group can see folders and files. The Owner and Group should have Make Changes privileges, and the Group must be set to Teacher. One level deeper, the "esp" folder must be set to allow the Owner, the Group, and Everyone to "See Files" and "See Folders," and its group



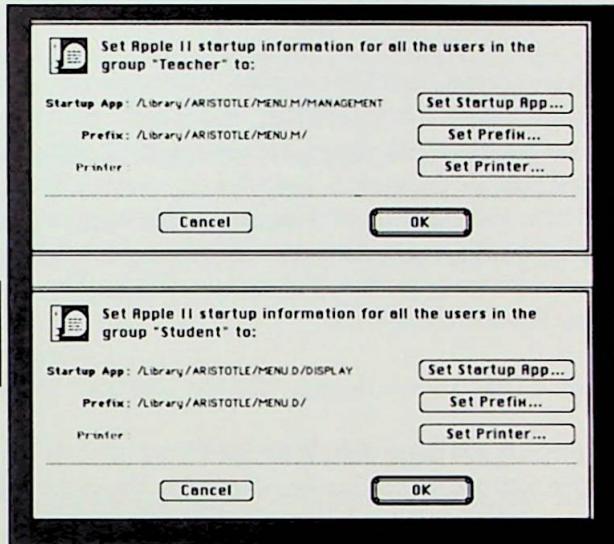
must be set to "Teacher." If these settings aren't correct, Aristotle won't be able to create or modify the "esp" folder within each user's folder. Without access to the "esp" folder, Aristotle won't add users to the user list.

- Choose the startup application for each of the Aristotle users. You can set a teacher's AppleShare startup application to "Management" or "Finder," depending on your preferences. You can set the



startup application for students to “Display” or “Finder.” (However, if you set it to anything other than Display, you allow users to freely roam the server volume from the Finder, defeating the management feature of Aristotle.) Set the Startup Prefix for all users to the folder that contains their individual startup applications.

- When programs from the server behave strangely—or don’t work at all—check the privileges settings on the AppleShare file server first. Setting them correctly can fix many problems.



Apple IIgs System Software Version 5.0: Setting Up an AppleShare Network

The following information applies to Apple IIgs System Software Version 5.0 and later.

Because of recent rapid development of the Apple IIgs operating system, setting up an AppleShare network with IIgs systems can be confusing. For example, the Apple II Setup disk included with AppleShare Version 2.0.1, a Macintosh disk designed to install Apple II features onto the Macintosh file server, is now obsolete. You should use the Apple II Setup disk that comes with the Apple IIgs System Software Update Version 5.0 and later. (Note that the software update must be purchased separately from the IIgs computer; see *Current Apple Upgrades and Updates*, page 26.) If you perform the AppleShare installation with the obsolete Apple II Setup disk from AppleShare Version 2.0.1, you get the following error message when you try to start up an Apple IIgs over the network:

`Cannot load (servername) /SYSTEM/SYSTEM.SETUP/CDev.Init.`

To properly add IIgs systems to an AppleShare network under Version 5.0, you must purchase the Apple IIgs System Software Update Version 5.0 or later. The update package includes the Apple II Setup disk and the manual *AppleTalk Network User's Guide for the Apple IIgs*.

Follow the steps below to set up AppleShare so that IIgs systems start up over the network.

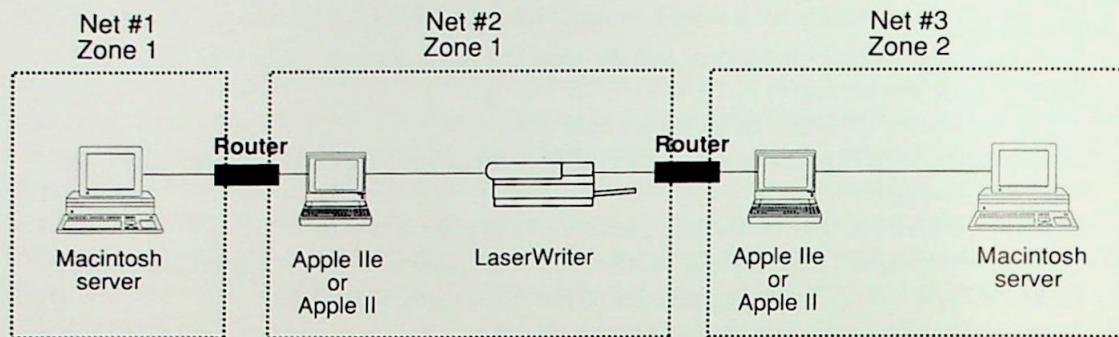
On the Macintosh server:

1. Start up with the System Tools disk and run Apple HD SC Setup.
2. Initialize the server hard disk.
3. Name the hard disk using an Apple II convention; for example, "A2." (The shorter the name, the better.)
4. Install the Macintosh System Software on the server, making sure to use the latest version possible for your Macintosh computer.
5. Restart with the AppleShare Version 2.0.1 Server Installer disk. Install "AppleShare 2.0.1 Server" onto the server volume. Be sure you don't click any of the Macintosh family installation scripts, because they will install old system software, overwriting the system software you just installed.
6. Restart from the AppleShare Server Admin disk and launch the Server Admin application.
7. Enter the administrator's key and password, name your server, and create the users and groups you need.
8. Choose Volume List from the Volumes menu and double-click the server volume. A dialog box allows you to set access privileges. Click all boxes and save enclosed folders.
9. Quit the Server Admin application and restart the Macintosh server from the Apple II Admin disk that came with the Apple IIgs System Software Update Version 5.0.
10. Launch the Installer program on the Apple II Admin disk, and install "Apple II Info" on the server volume; then quit.
11. Restart from the Server Admin disk and launch the Server Admin application.
12. From the Server menu, choose Server Info and click the Apple II feature. Then click Save.
13. Choose Volume List from the Volumes menu and double-click the server volume. A dialog box allows you to set access privileges. Click all boxes and save enclosed folders.
14. Quit the Server Admin application and restart the server. Keep the server on-line while you perform the steps for the Apple IIgs.

On the Apple IIgs:

1. Start up with the System.Disk that came with the Apple IIgs System Software Update Version 5.0, and format a blank 3.5-inch disk.
2. Launch the System 5.0 Installer on the System.Tools disk.
3. In the Installer, select "AppleShare on 3.5 Disk" and install it on the formatted disk. (You'll have to do some disk swapping.)
4. Shut down the IIgs and restart from the AppleShare 3.5 disk you just created.
5. Enter the administrator's name (usually "Administrator") and password. On the Graphic Control Panel under the Apple menu, click the AppleShare icon and mount the server volume.
6. Launch the Installer program on the IIgs System.Tools disk.
7. Using the Command key (Open Apple), select the following scripts:
 - Latest Sys. Files (No Finder)
 - Server Network Startup
 - Server Quick Logoff
 - Optional scripts (Install the scripts that the IIgs systems starting up over the network will require; for example, the SCSI driver, 5.25 driver, LaserWriter® printer, or AppleTalk® printer.)
8. Install the selected scripts on the server volume. The system installs over the network, and the double-arrow icon at the top left of your screen flashes. You may have to do some disk swapping, and the installation may take a fair amount of time.
9. Once the installation is complete, quit and shut off the IIgs.
10. Shut down the file server and restart it from the Server Admin disk.
11. Launch the Server Admin application.
12. Select all users, or all Apple IIgs users who you want to be able to start up over the network.
13. Under the Apple II menu, choose Set Startup, and designate "Finder" as the startup application. (It will be located at /servername/System/Finder.)
14. When you're prompted for a response, allow the system to set the prefix automatically.
15. If the users you selected will be using a network printer, select Set Printer.
16. Choose Volume List from the Volumes menu and double-click the server volume. A dialog box allows you to set access privileges. Click all boxes and save enclosed folders.
17. Quit the Server Admin program and restart the file server.
18. On the IIgs units that you want to start up over the network, reset the startup slot from the Control Panel. Systems with ROM 01 should have the printer port set to "Your Card," Slot 7 set to "Built-in AppleTalk," and the startup slot set to "7." Systems with ROM 03 should have the printer port set to "Built-in AppleTalk," Slot 7 set to "Built-in AppleTalk," and the startup slot set to "AppleTalk."
19. Restart the Apple IIgs. It now boots over the network and prompts you to enter a user name and password. Once you enter the name and password, the "progress thermometer" appears, and then you see the Apple IIgs System 5.0 desktop with the server volume icon at the top right.

Apple II: Zones and Network Booting



Once an Apple II workstation has started up over a network, the workstation is fully aware of zones, allowing the workstation to log on to any Apple II-prepared AppleShare file server in any zone available on the internet. The number of routers or zones does not affect access to the servers.

When the Apple II broadcasts an AppleTalk Transaction Protocol (ATP) for startup, it sends the request across the entire zone in search of an Apple II-prepared file server. In the figure above, "Net #1" and "Net #2" are in the same zone; the router passes the request from "Net #2" to "Net #1." The router does not pass the boot request across to the server in "Zone2."

Once startup is completed, the Apple II workstation software allows the user to choose any appropriate zone and log on to the desired Apple II-prepared server. In the example, the Apple II computer can now access the server in Zone2.

When a workstation is instructed to print, it looks for the chosen printer. Because the printer is on "Net #2" (the same network as the Apple II), the router determines that the address belongs on "Net #2" and refuses the traffic, because the address is local to "Net #2." However, when the Apple II requests service from the server, the router recognizes the server as one that belongs to "Net #1," and lets the request travel to the server.



Apple IIe: Configuring an AppleTalk Workstation

There are two ways to use an Apple IIe with a 5.25-inch drive as an AppleTalk workstation: You can start the Apple IIe system over the network, or you can build a 5.25-inch startup disk (to accommodate the workstation software, which is available only in the 3.5-inch format).

- **Startup Across the Network**

To start up across the network, you don't need 5.25-inch drives or workstation software. Prepare the AppleShare file server for use with Apple II computers. (See *Using AppleShare IIgs with GS/OS and Aristotle*, page 7.) Apple IIe/Apple II Workstation Card users can then power on without local drives; the computers start across the network. (For details about starting up across the network, see *Apple II: Zones and Network Booting*, page 12.)

- **Building a Local Startup Disk**

You'll need to use a 3.5-inch drive to build a 5.25-inch startup disk. The following files are the minimum for a network startup disk:

PRODOS
ATINIT
SELECTOR.SYSTEM
System.APPS
—LOGOFF
—LOGON
BASIC

In this configuration, the SELECTOR.SYSTEM file displays several applications. However, only the files File Server Log On, File Server Log Off, and ProDOS® BASIC run programs. All other choices display an error message and then return you to the SELECTOR. You cannot change the applications list in the SELECTOR window.

With the 5.25-inch startup disk you've built, the user can log on, log off, and enter Applesoft BASIC.

Accessing Aristotle Programs

If you're using Aristotle, you can save a one-line Applesoft BASIC program to the 5.25-inch disk so that the user can access the Aristotle programs. The program should look something like this:

```
10 PRINT CHR$(4) ;"-/servername/ARISTOTLE/MENU.D/DISPLAY"
```

Save the one-line program as MENU. To use it, select ProDOS BASIC in the SELECTOR window; the Applesoft prompt appears. Then type

-MENU

to access the Aristotle menu. Here is the structure of the Applesoft program:

PRINT CHR\$(4);	(to execute an immediate command)
"-	(run the program at the end of this pathname)
/servername	(name of the AppleShare file server volume)
/ARISTOTLE	(name of the subdirectory containing the Aristotle programs)
/MENU.D	(name of the subdirectory containing Display)
/DISPLAY"	(name of the Aristotle menu program to run)



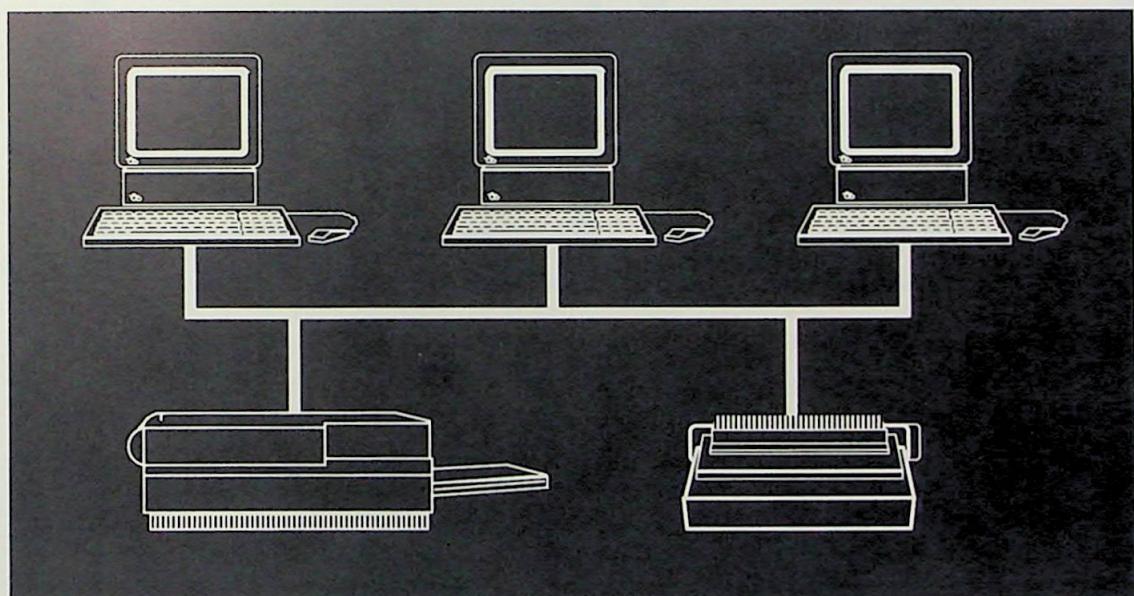
AppleWorks: Printing to Local and Network Printers

The following information is specifically for Apple IIe systems with the Apple II Workstation Card in Slot 7, and for Apple IIgs systems with original ROMs or the 01 ROMs only.

The AppleWorks® software provides a method for assigning a printing slot and allows three printers to be defined in the Printer Information screen. For example, to permit printing to local ImageWriter printers and a shared LaserWriter, follow these steps:

1. Set up the printer specifications for the local ImageWriter printer in Slot 1.
2. Set up an ImageWriter printer (for the ImageWriter Emulator used in the LaserWriter) for Slot 7.
3. Choose your printer by going to the Main Menu/Other Activities/Printer Information screen and selecting a new printer (Open-Apple-H).

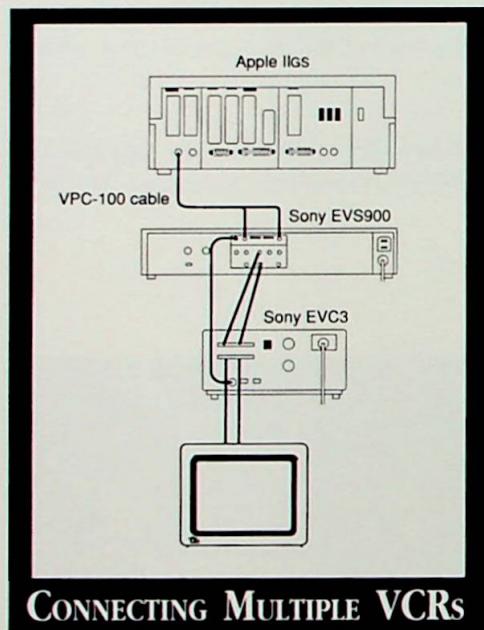
If other third-party applications you use allow a slot choice within the program, select Slot 1 for the local printer and Slot 7 for the network printer. Before you use a Slot 7 printer (the network printer), use the Chooser to select the appropriate network printer.



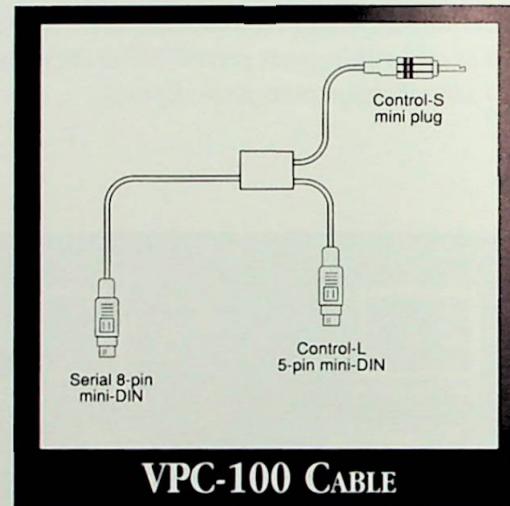
VidClip Developer Toolkits for Multimedia Applications

Video Production Controls (VPC) offers VidClip developer toolkits for interactive control of consumer videotape decks. VPC provides the software drivers and cable necessary for communications through the Apple IIgs serial port to consumer Sony VHS and 8mm VCRs, camcorders, monitors, laserdisc players, and Sony's Marica still-video camera.

VidClip toolkits supply everything the Apple IIgs, Macintosh, or HyperCard® developer needs to write interactive video and multimedia applications—including desktop video applications and videotape logging, retrieval, and assembly. All VCR functions are controlled by the VidClip software. A simple custom cable connects the computer to the remote port on the controlled device.



CONNECTING MULTIPLE VCRs



VPC-100 CABLE

For the Apple IIgs developer, the VidClip package includes APW™ (Apple IIgs Programmer's Workshop) OMF (Object Module Format) library routines, source calling examples and documentation, and cable. The kit is available from VPC or APDA™ at the following addresses:

Video Production Controls
38 Newbury Street
Boston, MA 02116
(617) 236-7006
AppleLink®: D2272

APDA
Apple Computer, Inc.
20525 Mariani Avenue, M/S 33G
Cupertino, CA 95014
1-800-282-2732 (USA)
1-800-637-0029 (Canada)
AppleLink: APDA

Orange Micro: Apple IIgs Color Printing

Because GS/OS printer communications are driver-based, printer compatibility depends on the availability of drivers. Apple IIgs-specific applications talk with the Print Manager; the Print Manager then communicates with the print driver selected in the Graphic Control Panel.

As shipped from Apple, GS/OS Version 5.0 provides direct-connect drivers for the ImageWriter, ImageWriter LQ, and Epson printers. LaserWriter, AppleTalk ImageWriter, and AppleTalk ImageWriter LQ drivers are included for AppleTalk printing. Only the ImageWriter drivers offer color support; the Epson driver does not provide color capabilities.

Orange Micro markets a serial-to-parallel converter called the Grappler 9-Pin, which enables users to print in color on parallel color printers. It also provides ImageWriter II emulation for Epson, Okidata, Panasonic, and other Epson-compatible parallel printers. Orange Micro provides the following list of Grappler 9-Pin-compatible printers:

- Epson: EX, FX, JX, RX, LX series; and the MX series with Grafrax
- Star: SD, SR, SG series; and Gemini 10X, NX-10 (in Epson FX mode)
- Okidata: 190, 290 series
- C. Itoh: C310XPR (Epson FX mode), ProWriter Jr.
- Panasonic: 1080, 1090 series
- Citizen: MSP-10 (Epson FX mode)
- Printers that are fully compatible with any of those listed above

For further information about the Grappler 9-Pin, contact Orange Micro at the following address:

Orange Micro
1400 N. Lakeview Avenue
Anaheim, CA 92807
(714) 779-2772



Applesoft BASIC: Printing to a Network ImageWriter II or LaserWriter

To print to an ImageWriter II or LaserWriter printer over a network from Applesoft BASIC, follow these steps:

1. Run Chooser II to select the printer you want to address. (To make sure the ImageWriter Emulator is downloaded to the LaserWriter, you may need to reselect the printer after other workstations print.) If you're using Apple IIgs System Software Version 5.0 or later, use the Control Panel to select the printer.
2. Use the following code to allow Applesoft BASIC to communicate with the chosen ImageWriter II or LaserWriter printer:

```
10  D$=CHR$(4)
20  Print D$; "PR#7"
30  Print "Hello Printer"
40  Print D$; "PR#0"
50  End
```



Apple IIe and SCSI Hard Disks

An unenhanced Apple IIe computer will not start up from an installed SCSI controller card. However, you can access the hard disk via Applesoft BASIC commands. For example, if the card is in Slot 7, type

PR#7

to access the hard disk.

If you install the Apple IIe Enhancement Kit, you'll be able to boot from the hard disk. If you want to make your hard disk the startup device, install the SCSI Controller Card in Slot 7.



Apple IIgs: Tabbing in Applesoft BASIC

An Applesoft PRINT TAB statement can be used on the Apple IIe with an ImageWriter II printer, provided that you precede it with a Tab Enable statement, as in the following example:

```
PRINT CHR$(9); "T E"  
PRINT TAB(10); "A"; TAB(20); "B"; TAB(30); "C"
```

On the Apple IIgs with an ImageWriter II, however, the preceding PRINT TAB statement results in spacing 10 or 20 spaces rather than tabbing to the columns.

When you use PRINT TAB for screen formatting, there is no such problem. On hard copy, however, PRINT TAB appears to be tabbing the specified spaces from the last character. For example, the following statement causes the first tab to be placed at column 20, while the second tab is placed at column 68:

```
50 PRINT TAB(20); "Column 20"; TAB(40); "Column 40"
```

Here's why: The first TAB statement puts the cursor at column 20. Because the Tab Enable statement defines each tab as 9 characters wide, the tab extends from column 20 to column 28 (one character at column 20, with the remaining 8 characters pushing the last character out to column 28). When the TAB 40 statement executes, 40 spaces are added to the last cursor location (column 28), placing the cursor at column 68.

There are two ways to handle this problem on the Apple IIgs:

- Use the HTAB statement to format columns; HTAB works correctly on the Apple IIgs—both on the screen and on the printer:

```
40 HTAB 40: PRINT "Column 40":HTAB 60: PRINT "Column 60"
```

- Use the "A" (Applesoft Tabbing) command, which makes the TAB command work correctly when you use a printer.



Apple 16: A Guide to IIgs Computing

Apple 16: A Guide to IIgs Computing is a nontechnical book that explains Apple technology and provides a comprehensive overview of hardware and software available with the Apple IIgs personal computer. The book features discussions of the following topics: the history of the 65816 chip, expansion of the Apple IIe to a 16-bit computer, memory expansion to 8 megabytes, daisy-chaining disk drives, CD-ROM drives, laser graphics, animation, word processing, AppleWorks, setting up the IIgs, ProDOS 16, telephone communications, add-ons and add-ins, desktop publishing, databases, spreadsheets, accounting programs, programming languages, video and stereo interfaces, music composition, AppleTalk and networking, the mouse, educational programs, and more.

Apple 16: A Guide to IIgs Computing is available only from the publisher.

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Apple IIgs 3.5-Inch Disk Drive: Interleave Factors

You can format 3.5-inch floppy disks under GS/OS using either the Erase Disk command in the Finder or the dialog box that appears when you insert a blank disk (or a disk with an unknown format) into the drive.

GS/OS (formerly ProDOS 16) gives you the option* of formatting 3.5-inch floppy disks with an interleave factor of 4:1 or 2:1.

- If you will be using a disk only under GS/OS, format it with 2:1 interleave—the most efficient method.
- If you will *also* be using the disk under the ProDOS 8 operating system, select 4:1 interleave.

ProDOS 8 accesses information from a floppy disk at a slower rate than does GS/OS; if you format the disk with 2:1 interleave, it will have to rotate almost one full revolution before ProDOS 8 can accept the next consecutive sector.

- The following factors determine when the interleave options appear:
 - From within an application, options are controlled by the application's programmer.
 - From the Finder, the options appear only when the Finder does not recognize a previously formatted or an unformatted disk.

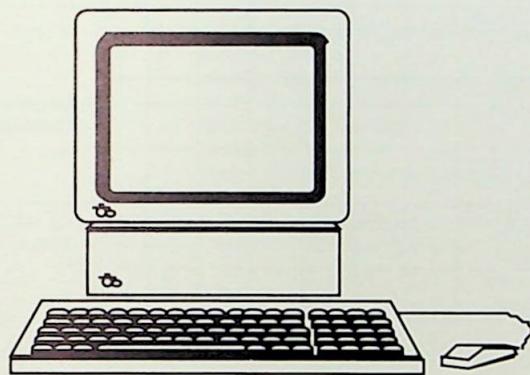


Current Apple II Operating Software and Product Upgrades

Thanks to the AppleGram™ staff for developing the following charts, which contain information about:

- The version of operating system software recommended for each of Apple's hardware products
- Current upgrade options available from Apple

For addition information about upgrades and updates, see page 26.



APPLE II OPERATING SOFTWARE

	Current Version	Date Released
System Disk (Apple Ile, Apple Ilc)	3.1	4/2/88
System Disk (Apple IIgs)	5.0.2	7/15/89
System Tools Disk (Apple IIgs)	5.0.2	7/15/89
Applesoft BASIC		
ProDOS Applesoft Sampler	1.2	3/5/85
ProDOS BASIC Programmer's Examples	1.1	10/26/84
ProDOS Applesoft Command Interpreter (BASIC.SYSTEM)	1.4	7/31/89
Getting Down to Basic Ile	1.1	6/12/86
ProDOS Applesoft Programmer's Asst. (APA)	1.4	6/28/84
ProDOS 8	1.8	6/14/89
ProDOS 16	1.3	6/29/87
Apple IIgs BASIC	1.0B4	9/15/87

APPLE II UPGRADES

	Apple Ilc	Apple Ilc Plus	Apple Ile (unenhanced)	Apple Ile (enhanced)	Apple IIgs
Apple Ilc Memory Expansion Kit	•				
Apple II 256K Mem. Exp. Kit	•	• ¹	• ¹	• ¹	• ¹
Apple Ile Mem. Exp. Card		•	•		
Apple IIgs Mem. Exp. Card					•
Apple Ile Enhancement Kit			•		
Apple IIgs Enhancement Kit			•	•	
Apple 5.25-inch Floppy Disk Drive	•	•	•	•	•
Apple 3.5-inch Floppy Disk Drive		•			•
UniDisk® 3.5-inch Floppy Disk Drive	•	•	•	•	•
Apple External 20SC Hard Disk				•	•
Apple External 40SC Hard Disk				•	•
Apple External 80SC Hard Disk				•	•
Apple External 160SC Hard Disk				•	•
AppleCD SC* (CD-ROM Drive)				•	•
Apple II SCSI Card			•	•	
Super Serial Card	•		•	•	
AppleTalk Workstation Card		•	•		
Extended 80-Column Text Card			•		
Apple II Video Overlay Card				•	•
Apple Modem (1200 bps)	•	•	•	•	•
Apple Modem (2400 bps)	•	•	•	•	•

¹This option requires the addition of the appropriate memory expansion card.

MONITORS

	Apple IIe	Apple IIC Plus	Apple IIgs
Apple Monochrome Monitor IIe	•		
AppleColor™ Composite Monitor IIe	•		
Apple Monochrome Monitor		•	•
AppleColor Composite Monitor		•	•
AppleColor RGB Monitor			•
Apple II Monitor Stand		•	•

Apple II Monitors

PRINTER UPGRADES

	ImageWriter II	ImageWriter I.Q.	LaserWriter	LaserWriter Plus	LaserWriter IIsc	LaserWriter II	LaserWriter IIINTX
ImageWriter 32K Memory Option (Apple II only)	•	•					
LaserWriter IIINTX 1MB Mem. Exp. Kit						•	
LaserWriter IIINTX 4MB Mem. Exp. Kit						•	
LaserWriter Plus Kit (ROM Upgrade for LaserWriter)			•				
LaserWriter Plus Kit (ROM Upgrade for LaserWriter Plus)				•			
LaserWriter IIINT Controller Card					•		
LaserWriter IIINTX Controller Card					•	•	

Memory Expansion

Logic Board Upgrades

NETWORKING & COMMUNICATIONS SOFTWARE

Access II	• Version 1.3.1
AppleShare	• AppleShare Print Server, v. 2.0.1 • AppleShare File Server, v. 2.0.1 • Apple II Setup Disk, v. 2.1
Apple File Exchange	• Version 1.1.2
Aristotle	• Version 1.0

MISCELLANEOUS PERIPHERAL OPERATING SOFTWARE

AppleCD SC	• Macintosh CD Setup, Version 2.0.1 • Apple II CD Setup, Version 1.0 • Apple IIgs CD, Version 1.1
------------	---

PRINTER SOFTWARE

LaserWriter	<ul style="list-style-type: none">• Laser Prep 5.2• LaserWriter Driver 5.2¹	<ul style="list-style-type: none">• IIgs LaserWriter Driver 3.0
LaserWriter Plus	<ul style="list-style-type: none">• Laser Prep 5.2• LaserWriter Driver 5.2¹	<ul style="list-style-type: none">• IIgs LaserWriter Driver 3.0
LaserWriter IIsc	<ul style="list-style-type: none">• LaserWriter IIsc Driver 1.1	
ImageWriter	<ul style="list-style-type: none">• ImageWriter 2.7 (for direct-connect printers)	
ImageWriter II	<ul style="list-style-type: none">• AppleTalk Apple IIgs ImageWriter 3.0 (for AppleTalk-connected printers)• Apple IIgs ImageWriter 3.0 (for direct-connect printers)	<ul style="list-style-type: none">• AppleTalk ImageWriter 2.7 (for AppleTalk-connected printers)• ImageWriter 2.7 (for direct-connect printers)
ImageWriter LQ	<ul style="list-style-type: none">• AppleTalk Apple IIgs ImageWriter 3.0 (for AppleTalk-connected printers)• Apple IIgs ImageWriter 3.0 (for direct-connect printers)	<ul style="list-style-type: none">• LQ AppleTalk ImageWriter 2.0 (for AppleTalk-connected printers)• LQ ImageWriter 2.0 (for direct-connect printers)

¹LaserWriter 6.0 is available for support of color PostScript printers, and will improve halftone printing on monochrome PostScript devices. Contact an authorized Apple reseller for details.

Many hardware upgrades have configuration prerequisites, and require installation by an authorized Apple service provider.

For complete information regarding any Apple upgrades or updates, contact your authorized Apple reseller or an Apple sales representative. For the location of the reseller nearest you, call (800) 538-9696.



Current Apple Upgrades and Updates

An **upgrade** enhances features of existing hardware or software. Generally, an upgrade involves a fee, and any additional Apple hardware must be installed by an authorized Apple service provider.

A software **update** consists of enhancements, fixes, or patches to software. An update to Apple software is handled through an authorized Apple dealer or your Apple sales representative.

Following is a summary of the Apple upgrades and updates currently available for Apple II products.

Apple IIe to Apple IIgs Upgrade

Your authorized Apple service provider can install a new logic board to upgrade the Apple IIe to an Apple IIgs.

Apple IIe to Enhanced IIe Upgrade (Apple IIe Enhancement Kit)

Your authorized Apple service provider can install the chips required to enhance the Apple IIe.

ProDOS Version 1.7

ProDOS Version 1.7 solves the problem that occurred with recognition of 1988 dates when third-party RAM cards were installed.

AppleWorks

For information about upgrades for AppleWorks, please contact:

Claris Corporation
440 Clyde Avenue
Mountain View, CA 94043
1-800-544-8554

Apple IIgs System Software Version 5.0.2

Apple IIgs System Software Version 5.0.2 corrects several problems discovered in the recently released System Software Version 5.0. The changes affect these disks: System.Disk, System.Tools, and AppleShare File Server Apple II Setup Disk.

All customers who purchased System Software Version 5.0 are entitled to a free upgrade to Version 5.0.2. Coupons for the software update are available from your Apple dealer or sales representative. An electronic version of the coupon is posted on the AppleLink network under the Apple Programs icon in the Upgrade and Update Programs folder. Fill out the coupon and mail it, along with an original Version 5.0 System disk, by April 15, 1990.

The Apple IIgs System Software is available as a stand-alone product (order number A0013LL/A) and as part of an Apple IIgs CPU product (order number A0012LL/A).

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